SYNTAX

SERVING TIMEX-SINCLAIR PERSONAL COMPUTERS

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QUOTE WITHOUT COMMENT

ALPHACOM TO SELL ZX/TS PRINTERS DIRECT

Alphacom sells VP-42 plug-compatible, thermal printers, Beige. Call 800/227-6703 (800/632-7979 in CA). MC/VISA/AMEX or check or MO to ALPHACOM, POB 306, Half Moon Bay, CA 94019.

PRODUCTION 1500s AND 2068s SOLD IN US

Early shipments of TS2068s are selling well--Sears reordered 4000 units according to Dan Ross, Timex VP. A few units available at the Boston Computer Society TS Celebration disappeared quickly. Buyers snapped up 1500's as well. Early tests suggest 1500 compatibility with most peripherals. Those confused by 16-32K internal memory will need some adaptor.

TIMEX SHOWS T-DOCK AND CARTRIDGE ADAPTOR

Cartridge software for TS1000/1500 owners will be available by using a $19.95 T-Dock to feed buss signals through and connect the ROM plug-in--which uses chip-on-board technology.

SQ-UP: In David Ornstein's premier issue article (SQ Winter 82 p. 29) Using Extra Keys on Big Keyboard, add a symbol A atop the D1 lead toward the right-hand edge of the page. The list of connections refers to this symbol. Also, the D3 (ANODE) legend applies to ZX80s, use D6 (ANODE) for ZX81s & TS1000s. Finally, change Jun.81 to Mar.81.

Charles H. Bouley

VENDOR REPORT

SQ closeout premium processing will continue to be slow. The book arrived in Harvard just before the BCS celebration & SYNTAX will pack and ship them early in Nov. Tapes will be **ordered** during that time and shipped after the books. Staff in circulation are changing subscriber records now. Labels will reflect the change within two months. You will not miss any issues, but please renew when you receive your notice; cross-checking the records takes a long time. You will see the changed expiration date on your label when we alter the record.

Memotech reports that only the RAM packs seem incompatible with the TS1500. No other problems reported so far. All plugins need extension cables to clear computer cables emerging from the back. Use your TS2040 printer, buy a flexible cable, or make an extender.

TRS Color printers work badly with Memotech's RS232 interface. Said Fateh says Memotech will make refunds if the interface is not damaged. Memotech uses standard 25-pin RS232 connectors; Radio Shack uses 4-pin DIN connectors and does not support the full standard.

Memotech apparently will not introduce further new products for ZX/TS machines. As you know, they have designed their own computer, which will be introduced in the US.

EZ-Loader contains a bug, says Ed Gidley. Kopak's Bob Schiller promises to provide the fix to all buyers of that package, as well as the printed manual to replace the computer-generated one supplied. By shifting manufacture in-house, Kopak hopes to improve quality control. Ed Gidley is sending the fix to SYNTAX--we'll pass it on.

Timex 2040 printers have disc ceramic capacitors on the **data** lines. These cut noise, but slow buss timing. Cut one lead on these caps (usually 82p) to restore timing--and **void your warranty.** Early models use caps tack-soldered on the circuit side of the board; later ones are marked C4, C5 & C6.

InfoWorld (V.5 N. 43 pp 57-58) says Budget Master 1000 contains no SAVE option--it's omitted from the program. SYNTAX called vendor HES (415/468-4111) who no longer offer the program in their catalog, but sell it on request. The reviewer feels it's a good program, you can repair the BASIC. HES software's Technical Support Coordinator says they quit supporting ZX/TS.

ZX/TS USERS' GROUPS

Bladensburg, MD: Capitol Area Timex/Sinclair User's Group, P.O. Box 725, Bladensburg, MD 20710. (Jim Wallace: 301/699-8712)

Bowie, MD: The Bowie Timex Computer Club, Lowell Demming, 12611 Beechfern Lane, Bowie, MD 20715.

Gainesville, FL: Timex-Sinclair User's Group, 3708 Newberry Road, Gainesville, FL 32607.

Iowa City, IA: James Carroll, 1001 Oakcrest #14, Iowa City, IA 52240

Newport, RI: Ocean State T/S User Group, c/o Bob Dyl, 15 Kilburn CT., Newport, RI 02840, 401/849-3805.

NEW PRODUCTS AND SERVICES

"HAM-HACKER"(TM) software includes: Morse Code 16K/2K practice w/ audio tone ($14.95), MINIMUF propagation ($17.95), CE AMP for common emitter circuit design and test ($19.95). All 10% off till 15 Dec.83. Hawg Wild Software, POB 7668, Little Rock AR 72217.

Four Hewson Consultants programs, 3 for Spectrum, and ZX/TS PUCKMAN 16K will be available from Hawg Wild for $15.95+$2 P&H ea. Backgammon, Countries of the World, and Night-flite are offered as compatible with your TS2068, but the Hawg is hedging--delivery may be delayed.

"POSTMASTER" in MC accepts address files & 2 user-defined codes, up to 75 records/tape. Quick search for fast retrieval. Review on screen or print to TS2040--$9.95 + $1 P&H TOOLKIT moves RAMTOP, prints bytes free, renumbers BASIC, or assembles MC using ZX/TS dec codes--$7.95 PPD GENEALOGY stores a four-generation family tree on one side of tape and prints to TS2040--$6.95 PPD. Z-WEST, POB 2411, Vista, CA 92083.

Computer literacy programs to teach programming concepts through games. Gridlock uses graphs, cooordinates, plots, and screen display. Turning the Truth Tables exercises logical thought via AND/OR, greater, equal, lesser, 0/1, and IF. Snake Eyes demonstrates random numbers and chance with histograms and classic casino games. All use graphic or text game format--$14.95 ea. Basic BASIC covers display, input, loops, moving graphics, and subroutines. User then builds upon the skeleton program to create an action game--$17.95. 2-BIT SOFTWARE, POB 2036, Del Mar, CA 92014. 619/481-3629.

Software in package deals qualifies for Timex's buy 2, get 2 free deal. Phoenix Enterprises, 1780 N. DuPont Hwy., No. 17, Dover, DE 19901.

UK acoustic modem connects to MIC & EAR jacks for simplex transmission of programs, blocks of memory, or screen contents between ZX/TS and Spectrum. Uses 5mA from computer power and UK modem frequencies--2 cycles of 1650Hz for mark and 2 of 2475Hz for space. No start or stop bits; byte only. Max. message is 15 Kbytes. Menu-driven software. £48 Micro-Myte Communications Ltd., Polo House, 27 Prince St., Bristol 1, UK. Tel. (0272)299373.

Contact Lens overlay for your ZX/TS membrane keyboards. rectangular, bevel-edge holes to guide fingers to keys. Adhesive backing. $7.95 PPD 30-day refund. Warren Imports Group, 81 Brookmill Blvd., Unit 80, Agincourt, ON Canada M1W 2L5.

Programmer's Market organizes 500 software publishers and marketers for your original programs. Lists contacts, requirements, payment terms, and contract work available. Organized by type of computer (31 Timex entries), type of software, & alphabetically. Writer's Digest Books, 9933 Alliance Rd. Cincinnati OH 45242. $16.95+$1.50 P&H. Visa or MC call 800/543-4644.

Two 16K, printer-compatible, filing packages by Russell Brewer. Rapid File--menu-driven edit, search, insert, & delete--machine code file handling and packed files. Rapid Finance lets user set up 19 accts, enter by date, account, amount, & optional comments for up to 500 entries. $10.95 ea, PPD in US. 26630 Mill Rd., Frazeysburg, OH 43822.

Power Squeezer drives up to 256 BSR controllers from your ZX/TS (1500's included) or allows 20 devices with software clock-calendar and 7-day program. Updates every minute. Cassette, transmitter & manual for $79.95 PPD (UPS Blue or Priority Mail). Avail. Dec.83, Advance orders to Goldwater Mfg. Co., POB 1715, Sandy, UT 84091.

IRA Organizer to record retirement fund transactions. Store date, deposits, withdrawals and interest. Seven-option menu: enter, correct, save, print, or display all, one or summary. On tape for 8K ROM/16K. $16.50 from John B. Carson, Jr., 11200 Lockwood Drive, Number 307, Silver Spring, MD 20901.

LAB PROGRAM I & II (BOD, COD, MLSS, MLVSS, SVI, TSS, Total Solids) menu driven, printer compatible. $24.95 each. Labsoft, 1707 King St., Jacksonville, FL 32204.

Data acquisition module multiplexes 14-channels via an integrating A/D to ZX/TS (incl. 1500) to measure V ac/dc, dc I, temp., or frequency. Reasonable ranges, but not industrial standard values. Allows random scan under program control. ROM software at addresses 15360-16383 called by USR. Results converted to quantity measured & returned in floating point for computation. User sets conversion time/channel to trade time (1-5 sec), error & noise rejection. No calibration needed. Works in 1K RAM, plugs on edge connector and extends buss. Model 2900-Z, $89 PPD. MC/VISA Occam Research, Inc., POB 1055, Trumansburg, NY 14866.

RPNZL programming system uses full-screen text editor for FORTH-like, stack-oriented syntax. Load/ save 12 times faster than ZX/TS BASIC & verify. Integer only, full string handling, resident monitor, plus TS2040 support. Language tape, editor/compiler, linker, & manual. Requires 16K RAM. $29.95+1.50 P&H. The Golden Stair, 141A Dore Street, San Francisco, CA 94103.

Peel & stick keys of resilient foam with characters & graphics in black and shifted characters in red. For ZX/TS keyboards to give soft feel. No keywords or functions on these. $5.95 PPD. E. H. Enterprises, POB 4068, Little Rock, AR 72214.

Add STORE & RECALL to BASIC--8K/16K

Adding BASIC commands can be accomplished by locating machine language subroutines in RAM that is safe from NEW and LOAD. Two ideal places are above RAMTOP or below address 16384, such as in Hunter's NVM. You call the commands with USR; either in immediate mode or from within a program. This example gives details for placing routines above RAMTOP or in the Hunter NVM.

STORE transfers a screen image (display file) above RAMTOP to be re-displayed by the RECALL command.

Enter listing one exactly as shown. Notice that you enter hex codes directly into the REM at line one. Line 6 translates these to decimal codes as it POKEs your program to the chosen RAM area.

LISTING ONE

```
   1 REM 2A0C4011487101180 3EDB0C
9214871ED5B0C4001180 3EDB0C9
   2 SAVE "ST/R■"
   3 FAST
   4 LET L=30000
   5 FOR F=16514 TO 16563 STEP 2
   6 POKE L,(PEEK F-28)*16+PEEK
(F+1)-28
   7 LET L=L+1
   8 NEXT F
   9 POKE 16388,48
  10 POKE 16389,117
  11 NEW
SYNTACTIC SUM:  13187, 8K ROM
```

SAVE the program by entering RUN. Now when you LOAD the tape, the program RUNs and transfers the routines to memory automatically.

STORE by using RAND USR 30000, RECALL by RAND USR 30012. STORE won't work in immediate mode since CLS always follows immediate entry.

After loading the routines in upper memory, RAMTOP is lowered to 30000, thereby protecting them from NEW and LOAD. To shield the STOREd screen from NEW and LOAD, relocate RAMTOP to 29000: POKE 16388,72; POKE 16389,113.

To change listing one for use with the Hunter NVM located at 8K, delete lines 9 and 10 and change

line 4 to LET L=8192. New calls are STORE, RAND USR 8192, and RECALL, RAND USR 8204.

Len Harmon, Metairie, LA

ASSEMBLY LISTING

```
7530 2A0C40  STOR LD HL,(DFILE)
7533 114871       LD DE,7148
7536 011803       LD BC,0318
7539 EDBO         LDIR
753B C9           RET
753C 214871  RACL LD HL,7148
753F ED5B0C40     LD DE,(DFILE)
7543 011803       LD BC,0318
7546 EDB0         LDIR
7548 C9           RET
```

MEMORY TESTER--8K/16K

My ZX/TS's erratic behavior when it ran big programs made me suspect memory problems. I wrote a BASIC program to perform a simple check of memory above the first 1K of RAM. It found two bytes where a bit was dropped; I fixed the 16K RAM by replacing one chip. This program can help if you suspect a memory problem.

MEMTST writes all zeroes into a byte, confirms that all bits equal zero by reading the byte, writes all ones in the byte, confirms that bits are all ones by re-reading the byte, then moves to the next byte. Lines 70 & 90 record errors.

To use MEMTST, first do the following without line numbers:

```
POKE 16388,0
POKE 16389,68
NEW
FAST
```

These POKEs set RAMTOP so the stack resides in the first K of RAM. (So MEMTST will not destroy the machine stack.) Type in MEMTST exactly as shown. In line 20, spell out words except REM. If you SAVE MEMTST, set RAMTOP before you LOAD it.

Run MEMTST. If all goes well, about 4.5 minutes later "END" will appear on the screen. If numbers show up, you have a memory problem.

Each line represents one bad memory location. On each line the first number shows the address of the erring location. The second number contains the code read from the location. The third number is the code written to the location.

To find which bits are bad in a location, convert codes first to hex and then to binary. Read the second number from a line on the screen and find it under the code column in appendix A of the BASIC manual supplied with your computer. Beside the code you will find a two-digit number in the hex column. Interpret each digit according to the following table:

HEX	BITS	HEX	BITS
0	0000	8	1000
1	0001	9	1001
2	0010	A	1010
3	0011	B	1011
4	0100	C	1100
5	0101	D	1101
6	0110	E	1110
7	0111	F	1111

For the two hex digits you'll have 8 bits. Thus, code 127 means hex digits 7F and binary, 01111111. In this example, if the 3rd number was 255, the leftmost bit is in error. (Zero gives all 0's; 255, all 1's.)

If the screen fills with errors when you RUN the program, push CONT to see more errors. Repeat until you see "END" displayed. RUN the program several times; some errors show up only on repeated trials.

Ron Charlton, Paducah, KY

```
  10 REM "MEMTST"
  20 REM POKE 16388,0 AND POKE 1
6389,68 AND NEW THEN RUN THIS PR
OGRAM
  30 LET B=0
  40 LET C=255
  50 FOR A=17408 TO 32767
  60 POKE A,B
  70 IF (PEEK A)<>B THEN PRINT A
,PEEK A;"   0"
  80 POKE A,C
  90 IF (PEEK A)<>C THEN PRINT A
,PEEK A;"   255"
 100 NEXT A
 110 PRINT "END"
SYNTACTIC SUM:  12889, 8K ROM
```

BOOK REVIEW

Title: The Ins & Outs of the Timex TS/1000 & ZX81
By: Don Thomasson
From: Melbourne House, Dept. CS
347 Reedwood Drive
Nashville, TN 37217
Price: $12.95 (Softcover, 101 pp.)

"At last a hardware reference manual which covers all aspects of the TS 1000!", reads the Melbourne House ad for "Ins and Outs". While the book provides a number of interesting tips and schematics, it falls far short of comprehensive coverage. Thomasson's book offers clearly printed pages and contains 15 circuit diagrams and 9 other illustrations. Three sections organize the book: Internals, the External Interface, and Externals. In addition, two very short appendices present some simple BASIC and MC driver programs.

Internals supposedly tells us all about the ULA (uncommitted logic array) or "workhorse chip." However, only 2 pages describe the general function of the chip before Thomasson (figuratively) throws up his hands over the "Machiavellian" complexities of the ZX's innards. Here he warns us again (the first several warnings come in the third paragraph of the introduction): "very little change is permissible" in the insides of our computers. This theme appears throughout the book: he tells us more about what we can't do than what we can do.

After a disappointing look at the ULA, Thomasson delves into the TS's use of IN and OUT ports (FB, FD, FE and FF) for tape loading and keyboard, and briefly describes the video display. He gives simple memory expansion schemes, as well as a basic big keyboard layout.

"The External Interface" pages describe the ZX/TS busses (internal and external) and investigate what those edge connector pins really do. Again we get a very brief view of the various functions available and Thomasson dismisses some out of hand as unusable. For example, for M1 (machine cycle one) he says "no external use can be envisaged". In fact, many add-on memories need M1 to decode addresses above 32K.

In the last section Thomasson addresses external add-ons: The chapter starts with a basic power supply and then moves to a simple, but somewhat expensive, 16K RAM. But, it appears that some control lines may be missing in the plans. (For instance, one 16K RAM plan shows a WR line, but no RD or MREQ--this memory probably works by itself, but could cause problems when used with other peripherals.) Thomasson discusses basic I/O ports using Z80 PIO and 8255 PPI chips, though again, very briefly.

Next, Thomasson introduces a Centronics style printer interface, potentially the most valuable part of the book. His design (software and hardware) should provide you a solid interface which even supports LLIST, LPRINT and COPY. Like Ener-Z's Report Generator board, Thomasson overlays ROM print routines at 0851H with his code. The chapter ends with examples of basic A/D and D/A converters, a sound generator, and 13 pages of BASIC program and explanation of a simulation of a model railroad system, not the real world control system advertised.

This book contains useful tips & hints, and the printer interface concept seems sound. I give this book 6 out of 10, as it doesn't live up to its claims.

Paul J. Donnelly, Centerport, NY

Manual references mean the Sinclair UK manual--with its differences. Display timing (p.13) applies to 50Hz systems. In the British way, you'll find some obtuse comments, but display and keyboard operations are clear, if brief. Five lines of text hint at how the simulator gets replaced in a control loop--KO.

MEMOTECH

The Complete Range

Fifteen months ago Memotech developed the first 64K Memopak, designed to maximise the capabilities of the Sinclair ZX81. Since then, using the ZX81 as a starting point, we've gone on to produce a comprehensive range of Memopaks, adding 16K and 32K memory expansions, utilities packages comprising a Word Processor, Z80 Assembler and Spreadsheet Analysis, plus Communication Interfaces, High Resolution Graphics and a professional quality Keyboard. To complete our range of Timex add-ons, we are now introducing the MEMOPAK RS232 Serial Interface.

RS232 Interface

The RS232 is an all-purpose interface which allows the Timex not only to output to suitable serial printers, but can link up with numerous types of peripheral or even other processors. The Interface has two main modes of operation: BASIC mode allows you to use the range of functions supplied in the RS232 EPROM within an ordinary BASIC program, and TERMINAL mode allows you to use your Timex as a terminal to another processor. The EPROM functions offered permit the user to send, receive and convert bytes between Z80 code and ASCII, as well as check the status of numerous control flags. Received or transmitted data can appear simultaneously on the screen, and received data may be printed simultaneously.

$79.95 cable $19.95

Memopak Centronics I/F

The BASIC commands LPRINT, LLIST and COPY are used to print on any CENTRONICS type printer. All ASCII characters are generated and translation takes place automatically within the pack. Reverse capitals give lower case. Additional facilities allow high resolution printing.

$59.95 cable $19.95

Memopak HRG

This pack breaks down the constraints imposed by operating at the Z80 character level and allows high definition displays to be generated. All 248 x 192 individual pixels can be controlled using simple commands, and the built in software enables the user to work interactively at the dot, line, character, block and page levels.

$79.95

Memocalc

The screen display behaves as a 'window' on a large sheet of paper on which a table of numbers is laid out. The maximum size of the table is determined by the memory capacity, and with a Memopak 64K a table of up to 7000 numbers with up to 250 rows or 99 columns can be specified.

$39.95

Memotext

Text is first arranged in 32 character lines for the screen with comprehensive editing facilities. On output the user simply chooses the line length required for printing and the system does the rest. Used with the Memopak Centronics Interface, the Word Processor makes available printout with 80 character lines, upper and lower case and single and double size characters.

$39.95

Memopak Memory Extensions

For those just setting out on the road to real computing, these packs transform the Timex from a toy to a powerful computer. Data storage, extended programming and complex displays all become feasible. Further details available on request.

16K Memopak $39.95
32K Memopak $79.95
64K Memopak $119.95

Z80 Assembler

The Assembler allows you first to code and edit a source program in the Z80 language, and then assemble it into machine code. You can now write flexible and economic programs. The Editor mode allows you to code directly in the right format, manipulate inidividual lines and control the exact placing of source and machine code. Routines may be merged or listed (even to a commercial printer using our Centronics Interface). The assembler mode handles all standard Z80 mnemonics, numbers in hex or decimal, comments and user-selected lables.

$39.95

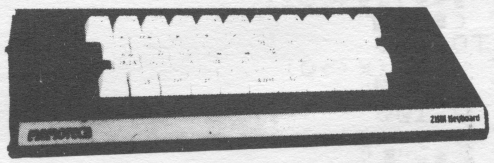
Memotech Keyboard

The Memotech plug-in Keyboard plus buffer pack takes the effort out of data entry for Timex users. The Keyboard has a light professional touch and is housed in an elegant aluminum case. The simple plug-in system means that you are not obliged to open up your Timex, use a soldering iron or invalidate your Timex warranty.

Keyboard Buffer Pak

The Buffer Pak performs a "housekeeping" function for the Keyboard, interfacing directly with the port of your Timex.

$79.95 — (keyboard & buffer included)



Note! All Memotech products carry a 6 mo. warranty. 80 column dot matrix printer packages available at a substantial savings from Memotech.

Order at no risk (10 day money-back guarantee): Call 1-617-449-6614. Or send your name, address, phone number and a check/money order/Visa or MasterCard number with expiration date to: Memotech Direct Sales Division, 99 Cabot Street, Needham, MA 02194.

Shipping/Handling $4.95

FUTURE HISTORY--2068

In Jan. 1981, SYNTAX published LIGHTS OF THE CITY for the recently announced (and long-awaited) 8K ROM for the ZX80--it would be 10 months before ZX81's were announced in the US. For kicks, we updated CITY for the TS2068--just as it was updated from a 1978 version for the PET.

Using simple graphics, this program generates an ever-changing video pattern like a growing city. To use, type RUN, then enter a PAUSE time (number of TV frames to display between moves). Depress P to run at top speed.

Variables x & y define line & column of the PRINT position. The program selects a random direction (up, down, right, or left), changes the current position accordingly, & prints a character there. Display freezes for z frames, then changes.

All the original program lines remain exactly, but we modified the program to add color. Lines 17 and 107 are totally new; line 5 shows a new INPUT prompt; line 100 includes an INK command inserted before c$.

You can run the old program on any ZX/TS with 8K of ROM: to see the original effect put your ZX/TS in FAST. Run this on your TS2068.

```
    2 RANDOMIZE
    5 INPUT "Number of Frames to
pause?";z: REM "N...": added
   10 LET x=12
   15 LET y=16
   17 PAPER RND*7: CLS : REM add
color
   20 GO TO 31+40*RND
   40 LET x=x+(x<>21)
   41 LET c$="▄"
   42 GO TO 100
   50 LET y=y+(y<>31)
   51 LET c$="▐"
   52 GO TO 100
   60 LET x=x-(x<>0)
   61 LET c$="▀"
   62 GO TO 100
   70 LET y=y-(y<>0)
   71 LET c$="▌"
  100 PRINT AT x,y; INK RND*7;c$:
  REM ink added for color
  103 IF INKEY$="p" THEN GO TO 20
  105 PAUSE z
  107 IF x=0 OR x=21 OR y=0 OR y=
31 THEN PAPER RND*7: CLS : LET x
=12: LET y=16: REM Restart if to
uch edge of screen
  110 GO TO 20
```

SYNCWARS-16--8K/16K

This "souped-up" version of my SYNCWARS game runs in SLOW mode (no screen flashes or jitter) and shows more spectacular displays. Otherwise, the program plays just as the 2K version, published in SQ Vol. 2 No. 1. This version uses about 6K of memory, so you need a RAM pack. First, enter the loader program of Listing 1. Check to see that it is exactly as listed, RUN the loader and input the decimal listing shown after listing 1. Syntactic Sum now gives 18889, and the top 5 program lines should look just like lines 1-5 of listing 2, the game program. Next enter lines 10-1590 of listing 2, replacing the MC loader.

To SAVE the program to tape, enter RUN 180. Line 180 shortens SAVE/LOAD time by compressing the display file. To play after you SAVE--BREAK, POKE 16389,128 and RUN. When LOADing, this byte will already be set correctly.

Do not make any changes in lines 1-5, doing so will result in a crash. You can employ this trick to discourage people from removing your byline from programs; sandwich title and byline REMs between MC routines (1, 3, & 5). Pulling line 2 or 4 will mess up the program.

Line 1 (16514) contains a MC screen reverse routine; POKEing the 5th byte (16518) with N+1 reverses the first N lines.

Line 3 (16556) fills the ZX/TS screen fast; the fifth byte (16560) again equals one plus the number of lines to fill; byte 12 (16571) sets the fill character. POKE 16571,0 (space) to create a "clear screen" faster than CLS, and use byte five to control how many lines of the screen you clear. I'm sure you can think of other uses.

Line 5 (16597) directs the computer to a wrong character-table start address; if byte 2 isn't 30, the screen turns to garbage. This creates the spectacular flash when you hit a zapper (key).

All 3 machine code routines are fully relocatable.

Line 210 graphics are:inv sp, inv ":", inv ".", inv "*", gr "A", "*", "." . The remaining graphics should be quite apparent.

Lines 650 and 750 set how much time you have to zap each invader; it gets shorter as you go along.

You try to destroy 10 invader pairs as they appear on screen. To shoot, you must depress the key corresponding to invader position. For example, press "1" if the invader is in the upper left corner, "enter" if it's all the way to the right a little below center, and so on. SHIFT and BREAK are unused.

You score when you hit the second of each pair of invaders; the first ("Syncloid robot") generates an "invisibility field" that hides the actual invader ("Synclon", the one you get points for.) If you miss the robot, the field disturbance is enough to tingle the Synclon's antennae, giving away his position; so if you're fast you can nail him even with the field still in place. Perfect score merits a special (and rather patriotic) display.

Have fun!!

FRED NACHBAUR, EL MONTE, CA

LISTING 1 (LOADER)

```
  1 REM 123456789012345678901
  2 REM SYNCWARS16
  3 REM 123456789012345678901
  4 REM F.NACHBAUR
  5 REM 12345
 80 FOR A=16514 TO 16601
 90 IF A=16534 THEN LET A=16556
100 IF A=16575 THEN LET A=16597
110 INPUT B
120 POKE A,B
130 PRINT (STR$ (B+1000))(2 TO
4);",";
140 NEXT A
SYNTACTIC SUM:  16760, 8K ROM
```

DECIMAL LISTING--READ LEFT TO RIGHT

```
 42  12  64   6  25 126 254 118  32
  4   5 200  24   3 198 128 119  35
 24 241  42  12  64   6  24 126 254
118  32   4   5 200  24   2  54  27
 35  24 242  62  30 237  71 201
```

```
  1 REM E£RND▚;COS /▀LEN ▐?7/ L
ET
  2 REM SYNCWARS16
  3 REM E£RND▚/COS /▀0.7/ PAUSE
  4 REM F.NACHBAUR
  5 REM Y2 GOSUB ?TAN
 10 GOTO 200
 20 REM CLEAR SCREEN
 30 POKE 16571,0
 40 LET M=USR 16556
 50 POKE 16571,27
 60 RETURN
 70 REM FLASH
 80 POKE 16598,64
 90 LET M=USR 16597
100 POKE 16598,PI
110 LET M=USR 16597
120 POKE 16598,22
130 LET M=USR 16597
140 POKE 16598,30
150 LET M=USR 16597
160 RETURN
180 POKE 16389,76
182 CLS
185 FAST
190 SAVE "SYNCWARS1▀"
197 CLS
200 SLOW
210 LET A$="▐▀▗▚▒*."
220 POKE 16418,0
230 FOR C=1 TO LEN A$
240 POKE 16571,CODE A$(C)
260 LET M=USR 16556
265 GOSUB 70
270 NEXT C
280 LET A$="1234567890QWERTYUIO
PASDFGHJKL"+CHR$ 118+"ZXCVBNM."
290 LET E=3
300 LET G=28
310 LET I=18
320 LET K=18
330 GOSUB 1050
340 GOSUB 1260
350 GOSUB 70
360 GOSUB 1070
370 GOSUB 1260
380 GOSUB 70
390 GOSUB 1140
400 GOSUB 1260
410 POKE 16518,25
420 GOSUB 1390
430 PRINT AT 2,11;"SYNCWARS";AT
11,11;"BY F.NACHBAUR"
440 GOSUB 1260
450 GOSUB 1260
460 PRINT AT 0,2;"YOUR COMPUTER
IS BEING INVADEDBY 10 DREAD SYN
CLONS AND THEIR  ""INVISIBILITY
FIELD"" ROBOTS, THESYNCLOIDS."
470 LET G=10
480 LET I=3
490 GOSUB 1050
500 GOSUB 1100
510 PRINT TAB 5;"SYNCLOID   SYN
CLON";,,
520 PRINT "   AT FIRST ONLY THE
SYNCLOID   ROBOT APPEARS; YOU M
UST DESTROY IT TO MAKE ENEMY SYN
CLON VISIBLE(BY PRESSING KEY COR
RESPONDING  TO ITS POSITION), AN
D THEN VAP- ORIZE THE SYNCLON TO
SCORE. IF  YOU MISS THE ROBOT,
BUT HIT THE (HIDDEN) SYNCLON, YO
UR SHOT IS  STILL VALID."
```

SYNCWARS-16 CONTINUED

```
  530 PRINT AT 22,0;"  PRESS P"
  540 PRINT "  TO START."
  550 IF INKEY$="P" THEN GOTO 570
  555 IF INKEY$="A" THEN GOTO 143
0
  560 GOTO 550
  570 LET F=0
  575 CLS
  580 FOR C=1 TO 10
  590 GOSUB 20
  600 FOR A=1 TO RND*40
  610 NEXT A
  620 GOSUB 1160
  630 LET M=USR 16556
  640 GOSUB 1050
  650 FOR A=1 TO 15-C/2
  660 LET D$=INKEY$
  670 IF D$="" THEN GOTO 720
  680 GOSUB 70
  690 IF D$=A$(H+1) THEN GOTO 830
  700 IF D$<>A$(D+1) THEN GOTO 92
0
  710 GOTO 740
  720 NEXT A
  730 GOTO 880
  740 GOSUB 1070
  750 FOR A=1 TO 10-C/3
  760 LET D$=INKEY$
  770 IF D$="" THEN GOTO 810
  780 GOSUB 70
  790 IF D$<>A$(H+1) THEN GOTO 92
0
  800 GOTO 830
  810 NEXT A
  820 GOTO 880
  830 GOSUB 1140
  840 LET F=F+1
  850 PRINT AT 23,0;"SCORE=";F
  860 GOSUB 1260
  870 GOTO 1000
  880 GOSUB 20
  890 PRINT AT 10,10;"TOO SLOW"
  900 GOSUB 1260
  910 GOTO 1000
  920 PRINT AT I+1,K;">■<"
  930 FOR A=1 TO 5
  940 LET D$=INKEY$
  950 IF D$="" THEN GOTO 990
  960 GOSUB 80
  970 IF D$=A$(H+1) THEN GOTO 830
  980 GOTO 1000
  990 NEXT A
 1000 NEXT C
 1010 GOSUB 1380
 1020 GOSUB 1260
 1030 IF F=10 THEN GOSUB 1290
 1035 PRINT AT 20,2;"PRESS A TO S
TOP"
 1040 GOTO 530
 1050 PRINT AT E+1,G;"> <";TAB G;
"▀▄";TAB G;"▀▄";TAB G;"▄▀";TA
B G;"▘▝"
 1060 RETURN
 1070 GOSUB 1120
 1080 GOSUB 20
 1090 GOSUB 1120
 1100 PRINT AT I+1,K;"> <";TAB K;
"▀▄";TAB K;"▄▀";TAB K;"▟▙";TA
B K;"▗▖"
 1110 RETURN
 1120 PRINT AT E+1,G;" / ";TAB G;
"< <";TAB G;"▗▀*";TAB G;"▄▀";TA
B G;"▘▝"
 1130 RETURN
 1140 PRINT AT I+1,K;"BOOM";TAB K;
" *▪* ";TAB K;"***";TAB K;" *▪* ";TA
B K;"▪*▪"
 1150 RETURN
 1160 LET D=INT (RND*38)
 1170 LET E=INT (D/10)
 1180 LET G=(D-10*E)*3+E
 1190 LET E=E*6-1
 1200 LET H=INT (RND*38)
 1210 IF H=D THEN GOTO 1200
 1220 LET I=INT (H/10)
 1230 LET K=(H-10*I)*3+I
 1240 LET I=I*6-1
 1250 RETURN
 1260 FOR A=1 TO 15
 1270 NEXT A
 1280 RETURN
 1290 LET S$="▪▪▪▪▪▪▪▪▪▪▪▪"
 1295 FOR C=1 TO 2
 1297 IF C=2 THEN LET S$="
"
 1300 FOR D=1 TO 24
 1310 POKE 16518,D
 1320 LET M=USR 16514
 1330 IF D=18 THEN PRINT AT D,8;"
***TOP SCORE***"
 1340 IF D=17 OR D=19 THEN PRINT
AT D,8;"================"
 1345 IF D>15 THEN PRINT AT D-16,
0;S$
 1350 NEXT D
 1360 NEXT C
 1365 PRINT AT 1,0;S$,,,,S$,,,,S$
,,,,S$,,,,S$
 1370 RETURN
 1380 PRINT AT 12,8;" END OF GAM
E. ",,,,"FINAL SCORE=";F;" OUT O
F 10"
 1390 FOR A=1 TO 6
 1400 LET M=USR 16514
 1410 NEXT A
 1420 RETURN
 1430 CLS
 1440 IF F=10 THEN GOTO 1520
 1450 PRINT AT 8,5;"SORRY--",,,,"
THE SYNCLONS YOU MISSED GOT INTO
YOUR COMPUTER. YOU'RE IN TROUBLE
NOW."
 1455 FOR A=1 TO 100
 1460 IF A>70 THEN PRINT AT 18,10
;"▄▀▀▀▀▀▀▀▀▄";TAB 10;"▌**ALERT*
*▐";TAB 10;"▀▄▄▄▄▄▄▄▄▀";AT 18,1
0;"▀▀▀▀▀▀▀▀▀▀";TAB 10;"▀▀▀▀▀▀▀▀▀▀
▀▀";TAB 10;"▀▀▀▀▀▀▀▀▀▀"
 1462 IF A>80 THEN LET M=USR 1651
4
 1465 NEXT A
 1470 FOR A=1 TO 29
 1480 POKE 16598,A
 1490 LET M=USR VAL "16597"
 1500 NEXT A
 1510 GOTO 1530
 1520 PRINT AT 8,5;"**CONGRATULAT
IONS**",,,"YOU'RE A HERO.",,,,"T
HE SYNCLONS GAVE UP AND WENT  H
OME.",,,,"REPORT TO LOUNGE FOR R
 AND R."
 1530 FOR A=1 TO 100
 1540 IF INKEY$<>"" THEN GOTO 156
0
 1550 NEXT A
 1560 CLS
 1570 POKE 16598,30
 1580 LET M=USR 16597
 1590 PRINT AT 11,15;"END"
SYNTACTIC SUM:  62584, 8K ROM
```

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Memory expansion is only the BEGINNING of the possibilities available through **BASICare** ... the ONLY expandable-expansion system for Timex-Sinclair computers.

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DEAR EDITOR:

While I'm eagerly awaiting the TS2068 I'm concerned that I cannot load my ZX/TS programs from tape. Will a program to allow this be available soon?

Sigmund T. Mentzel, Crown Point, IN

Probably. UK customers can now buy a program, ZX SLOWLOADER, to read ZX81 tapes into SPECTRUM, let you modify them, then save in SPECTRUM format. It may not work directly, but I expect equivalent products for the 2068--KO.
(-10 East London Robotics, Gate 11, Royal Albert Dock, London E16, UK Tel. 01 474 4430, VISA, 24-hours)

When I attach a 64K memory to my ZX/TS, I can't use more than 16K of its capacity. Should I modify my ZX-81 as John Oliger recommended in SQ Summer 83 p.47?

John K. Mitchell, Westwood, MA

ZX/TS machines will not set RAMTOP above 16K by themselves; you must POKE locations 16388 & 16389 to set it higher. John's computer change allows you to run machine code in the 16-32K block of RAM. If you do make the change, tie pins 1 & 13 of the 74LS10 to Vcc (Jul.83 p.2)--KO

I suggest two improvements in publishing machine code listings. Please state when the routines can be relocated. In those cases where the code is not relocatable, please point out or mark absolute codes and addresses to recalculate for use in other memory locations.

This would save time for those of us who try to relocate code and then find that it won't run without some alteration.

R. Harder, N. Vancouver, BC, Canada

MC authors, please tell SYNTAX what to point out and we'll comply--KO.

I found your information on modifying "VU-FILE" very useful (Sep.83 p.13). Converting Sinclair programs to QSAVE has stopped me cold with my limited knowledge of programming. Please publish more in-depth solutions to convert such programs as "Checkbook Manager" and "VU-CALC" to QSAVE.

A. Sloan, Green Bay, WI

I subscribe to your magazine and find it most informative; maybe someone can help me. The Psion Flight Simulator is entertaining; adding a joy stick could make it better. Recently I bought Zebra's adaptor which accepts an Atari joy stick. Sadly, the program is not designed for a joy stick and the instructions with the adapter for adjusting the Program did not help me. I am not an experienced programmer.

I hope you can help, I know of at least 4 other persons who have the same problem.

Bob Eikhof, Warwick, NY

We've also had a request to modify The Fast One to 64K. SYNTAX needs help from readers to do these--KO.

Occasionally the H,J,K,L half-row of my ZX/TS keyboard locks or else prints blank spaces. Thinking it was a heat problem, I drilled holes in the case. At the same time, I cleaned the contacts of the keyboard plugs. After about a week it began locking-up again. Any suggestions?

Don W. Downs, Bourbonnais, IL

Check the schematic (SQ Winter 82), that half-row goes to A14 through a diode. How does ENTER behave? Any open (solder joint, diode, cable) locks a half-row. Is the logic 1 of A14 marginal? The Z80 could be becoming heat sensitive. Printing spaces instead baffles me--KO.

I had a problem with a TS1000 which, with a 64K RAM, developed temperatures of 95-100F measured on the keyboard face just over the heat sink using a thermometer covered with aluminum foil. After a crash, applying ice restored the machine immediately, verifying the heat problem.

I reduced the supply voltage by inserting a series resistor in the plus power lead. Since my unit with 64K RAM attached draws 0.6A, I used 2 Ohms. This cuts the applied voltage by 1.2V. When connected, the voltage at the ZX/TS power inlet measures 8.1V.

Now, temperature at the face of the keyboard does not exceed 85F at 74F room temperature and I can keep the computer on for many hours with no heat problem.

Use more resistance for lower current drawn by attachments. You must calculate resistor values so that the voltage doesn't fall below 7V even with power fluctuations. About 8V seems a good compromise.

Frederick M. Lewis, Burnt Hills, NY

All the power supply tips and fixes I see replace or improve the 9V input to the computer.

I use a 5V-6A, regulated, adjustable, regulated power supply with OVP directly to the board, bypassing the ZX/TS regulator.

Is this dangerous?

Mike Thornton, Borrego Springs, CA

Fred's problem points to 7805 thermal shutdown, 5V goes away and 9V goes up. Mike's solution presents no danger, but accessories that use 9V from pin 2B of the edge connector do not work--KO.

You can defeat the "Program Access Security System:" use good ole...SAVE CHR$ USR 832"name". As the program SAVEs, hit BREAK.

Michael Bowman, Arab, AL

On p.13 Jun.83, you inform Mr. Brandao about the "input" level for MIC plugs being 5 mV peak to peak. I don't understand; do you mean the ZX/TS MIC jack OUTput? While we're at it, what INput level does the EAR-jack need for proper loading?

Cedric Bastiaans, Los Angeles, CA

OK, one man's Mede is another man's Persian, and computer output equals recorder input. In any case: at MIC jacks, signals equal 5 mVpp; at the EAR jack, about 4.5 Vpp. TTL levels also work as EAR jack inputs SYNTAX Jun.83 p.20--KO

Timex left out 2 key commands from their VU-CALC documentation. "P" copies the screen to the printer, and "D" deletes a formula at the cursor position. (Sinclair and Psion included these instructions--KO.) VU-CALC is NOT compatible with Memotech interfaces.

Sometimes my Gemini 10 printer omits characters or prints in the wrong place. Memotech checked out my interface, and my printer checks out. Could this be an incompatibility between the interface and the printer? Memotech is by far the nicest company I've dealt with and their helpfulness is to be praised.

Jim Payne, Dover, DE

Yes, but if you can determine the pattern of behavior, you can probably overcome it. Test for code or character sequences that cause this problem. Let us know what you find--maybe we can cure it--KO.

$49.99 SPECIALS IN NEW YORK CITY

Paul Donnely reports you can buy: TS1000+16K RAM+3 Software Packages from Yair Imports, E. 45th St. or 47th St. Photo, 67 W. 47th St. all for $49.99 total. You can call 47th St Photo at 800/221-7774 or 800/221-5858 or 212/260-4410. He says Frogger is available.

COMPATIBILITY OF MACHINES

Many of us are trying to find out which peripherals work with what machines. Information is very sketchy, but here's what SYNTAX has learned so far.

Software

So far, we know of no ROM changes in the 1500. The keypress channel changing (see p.8, TS1500 manual) uses hardware; Timex says no ROM entry point changes.

SYNTAX loaded a ZX SPECTRUM starter tape into the 2068. BASIC programs LOADed and ran. MC gave out of memory reports and would not run, but the loading patterns look correct in the border.

ZX/TS software, including MC, runs on the 1500. All programs in this issue were tested on both.

Third-Party Hardware

All ZX/TS peripherals that extend more than 1 3/8 inches to the left (viewed from the keyboard side of the computer) of the edge connector or more than 3/8 inch to the right, need an extender about 1 1/2 inches long to clear the power and video cables. The printer plug of your TS2040 will do.

Jerry Minchey of Byte-Back reports that they tested all their modules and all Byte Back modules function with TS1500s. But new, wide modules need a 1 1/2-inch extender plug ($6.95+$3 S&H) so you can connect the cables to the rear. Old, narrow module designs plug on directly. Or, use Computer Continuum's flexible cable.

Jerry also informs us that BB 64K memories work with the TS1500 because they don't disable internal RAM--rather, it runs in parallel.

Memotech says their RAM packs don't work with the 1500, but they received no other problem reports. When SYNTAX checked, Memotech had not tested for problems.

Timex Hardware

Timex changed RAM CS on the edge connector to RAM RM. Edge-connector pin assignments are on p.150 of the TS1500 manual. When you attach an external 16K & pull RAM RM high, the internal memory goes to 16-32K. (This puts system variables in the external RAM--KO)

In their OCT.83 newsletter, the Boston Computer Society says that TS1500's use an octal bus transceiver (74LS245) to partition the data bus. BCS had suggested this technique to modify your ZX/TS in the SEP.83 Sinclair-Timex User Group Newsletter.

TS2040 printers work with all the machines, but we hear that 12-15% of early 1500s might not drive the printer properly.

TS2068 edge connectors differ from both 1000s & ZX SPECTRUM--and the manual does not contain the pin assignments. Differences include both the number of pins and the function performed by a given pin. (Sinclair similarly altered the locations of some functions between the ZX81 and the ZX SPECTRUM.

NEW KEYBOARDS

Keys of 1500s move, are soft gray rubber, use white characters and graphic symbols and black shift functions. Three 1500 keys occupy the same space as four ZX/TS keys. Markings are rearranged--primary character at top center, shifted character at bottom left, graphic at bottom right.

TS2068 keys move, are hard white plastic with comfortable left-right dished tops, use black characters & graphics and show the symbol shift characters in white on black bands across the key bottoms. Key spacing is also 4/3 bigger than ZX/TS spacing. The 2068 offers two caps shift keys, a separate symbol shift key, a BREAK key (physically separate, but electrically another space key) and a long space bar.

ACCOUNTS--8K/16K

ACCOUNTS, an accounting program for small businesses, computerizes your DOME monthly accounting book. It allows up to 240 accounting records, either debit or credit, in 40 different categories. You choose each code definition.

Menus and prompts guide you. Usually ENTER moves you along to the next phase, but if all else fails, simply GOTO 10 to return to the menu. DO NOT RUN!

After loading ACCOUNTS, you see its menu and control portion (lines 10-170). Just touch the key for the first letter of each option to invoke it. Each option returns to the menu upon completion.

If you choose BEGIN (1xxx), the program clears all data and variables and asks for data input. Respond to DATE with six characters, year first; TO/FROM with up to 15 characters; REASON up to 10 characters; CODE with two-character account code; and AMOUNT with dollar value. As written, the first 32 codes automatically debit (no minus sign required, but the program stores the value as negative). Correct any item during entry using the DELETE key. You get a chance to check your entries before choosing YES or NO. After your last entry, use QUIT instead of YES to return to the menu. A flashing message tells when you can enter only five more records.

CONTINUE (2xxx) works like BEGIN, except it does not clear previous data. Instead, it appends new data to the previous records.

VIEW (3xxx) lets you scan entries by year or month. As the screen fills, ENTER makes room for more. Finally you see a summary. This takes the longest due to the ROM's floating point calculator.

PRINT (4xxx) sends selected records and summations to an 80-column printer. Change the formatting here for a 32-column printer. CHR$ 155;"A" gives carriage return/line feed via Memotech's I/F, for which I wrote this program. The 80-column printer gives neat, formal accounting reports.

FILE (5xxx) presents facts about file and space usage, including records used, contents of last record and total program and variables size.

EDIT (6xxx) allows selected altering or deleting of records. DELETE merely nulls a record and does not physically remove it. If space gets tight, you may ALTER new data into a deleted record. Unlike BEGIN, when editing you must put a negative sign in the AMOUNT field.

SAVE (9xxx) sets up cassette save of program and data. Just ready the cassette in record mode and enter the name under which you want to save the program.

Subroutine at lines 7xxx gives start and stop parameters for VIEW and PRINT options. 8xxx adds entries within each account code.

You can get a tape of this program for $3 from me.

James R. Shoaf III, POB 2147,
Santa Clara, CA 95055-2147

Variables:
D(240) stores DATE (numeric)
A(240) stores AMOUNT
T(40) stores each acct subtotal
Q(3) stores credit, debit and net totals
C$(240,2) stores acct CODE (string)
Y$(240,10) stores REASON
W$(240,15) stores TO/FROM
Z$(15) stores SAVE name, misc. inputs
X contains number of records used
I loop counter during data input
M loop counter during VIEW and PRINT
F loop counter for flashing message
K loop counter during summation
N indicates current record
L indicates month
Z indicates year
G indicates start time
S indicates stop time
R indicates items per display

```
   1 REM    A C C O U N T S .
   2 REM BY JAMES R SHOAF III,
BOX 2147, SANTA CLARA, CA 95055-
2147.
   3 REM  ALL RIGHTS RESERVED.
  10 CLS
  20 PRINT AT 3,12;"ACCOUNTS"
  30 PRINT AT 5,5;"BEGIN  NEW  A
CCOUNTS."
  40 PRINT AT 7,5;"CONTINUE ADDI
NG DATA."
  50 PRINT AT 9,5;"VIEW ACCOUNTS
 DATA."
  60 PRINT AT 11,5;"PRINT ACCOUN
TS DATA."
  70 PRINT AT 13,5;"EDIT A RECOR
D"
  80 PRINT AT 15,5;"SAVE PROGRAM
 AND DATA."
  90 PRINT AT 17,5;"FILE INFORMA
TION."
 100 IF INKEY$="B" THEN GOTO 100
0
 110 IF INKEY$="C" THEN GOTO 200
0
 120 IF INKEY$="V" THEN GOTO 300
0
 130 IF INKEY$="P" THEN GOTO 400
0
 140 IF INKEY$="S" THEN GOTO 900
0
 150 IF INKEY$="F" THEN GOTO 500
0
 160 IF INKEY$="E" THEN GOTO 600
0
 170 GOTO 100
1000 DIM D(240)
1010 DIM A(240)
1020 DIM T(40)
1030 DIM Q(3)
1040 DIM C$(240,2)
1045 DIM Z$(15)
1050 DIM Y$(240,10)
1060 DIM W$(240,15)
1070 LET N=1
1100 CLS
1110 FOR I=N TO 240
1120 LET X=I
1200 PRINT AT 0,8;"DATE = ?YYMMD
D"
1210 INPUT D(I)
1220 PRINT AT 0,15;D(I);"   "
1300 PRINT AT 1,5;"TO/FROM = ?"
1310 INPUT W$(I)
1320 PRINT AT 1,15;W$(I)
1400 PRINT AT 2,5;"PURPOSE = ?"
1410 INPUT Y$(I)
1420 PRINT AT 2,15;Y$(I)
1500 PRINT "ACCOUNT CODE = ??"
1510 INPUT C$(I)
1520 PRINT AT 3,15;C$(I)
1600 PRINT AT 4,6;"AMOUNT = ?"
1610 INPUT A(I)
1615 IF VAL C$(I)<=32 THEN LET A
(I)=-A(I)
1620 PRINT AT 4,15;A(I);"      "
1700 PRINT AT 7,5;"ALL ENTRIES O
K? (YES/NO/QUIT)"
1710 IF INKEY$="Y" THEN GOTO 181
0
1720 IF INKEY$="N" THEN GOTO 180
0
1730 IF INKEY$="Q" THEN GOTO 10
1740 GOTO 1710
1800 LET I=I-1
1810 FOR F=1 TO 10
1820 IF I>235 THEN PRINT AT 20,8
;"FILE ALMOST FULL"
1830 IF I>235 THEN PRINT AT 20,8
;"FILE ALMOST FULL"
1840 NEXT F
1850 CLS
1860 NEXT I
1900 GOTO 10
2000 LET N=X+1
2010 GOTO 1100
3000 GOSUB 7000
3005 LET R=0
3010 PRINT "REC.NO.";TAB 10;"DAT
E";TAB 16;"CODE";TAB 22;"AMOUNT"
3020 PRINT "TO/FROM";TAB 20;"REA
SON"
3030 PRINT "==========
==========="
3100 FOR M=1 TO X
3110 IF G<D(M) AND D(M)<S THEN G
OTO 3130
3120 GOTO 3150
3135 PRINT M;TAB 9;D(M);TAB 17;C
$(M);TAB 22;A(M)
3140 PRINT W$(M);TAB 20;Y$(M)
3142 PRINT "----------
----------"
3143 GOTO 7500
3145 GOSUB 8000
3147 LET P=INT (100*M/X)
3150 NEXT M
3200 INPUT Z$
3210 CLS
3220 PRINT "CODE    AMOUNT"
3230 PRINT "--------------"
3300 FOR M=1 TO 40
3310 IF T(M)=0 THEN GOTO 3350
3315 IF M<10 THEN GOTO 3328
3320 PRINT " ";M;"     ";T(M)
3323 GOTO 3330
3328 PRINT " 0";M;"     ";T(M)
3330 IF T(M)<0 THEN LET Q(1)=Q(1
)+T(M)
3340 IF T(M)>0 THEN LET Q(2)=Q(2
)+T(M)
3350 NEXT M
3400 LET Q(3)=Q(2)+Q(1)
3410 PRINT
3420 PRINT "INCOME = ";Q(2)
3430 PRINT TAB 7;"EXPENSE = ";Q(
1)
3440 PRINT TAB 15;"NET = ";Q(3)
3450 INPUT Z$
3460 GOTO 10
4000 GOSUB 7000
4002 IF L=0 THEN GOTO 4006
4004 GOTO 4010
4006 LPRINT "     YEAR = 19";Z;C
HR$ 155;"A";CHR$ 155;"A"
4008 GOTO 4020
4010 LPRINT "     YEAR = 19";Z;"
   MONTH = ";L;CHR$ 155;"A";CHR$
 155;"A"
4025 LPRINT " DATE    TO/FROM
    REASON     CODE  AMOUNT";C
HR$ 155;"A"
4030 FOR M=1 TO X
4040 IF G<D(M) AND D(M)<S THEN G
OTO 4100
4050 GOTO 4200
```

```
4100 LPRINT D(M);"  ";W$(M);"  "
;
4110 LPRINT Y$(M);"  ";C$(M);"
 ";A(M)
4150 GOSUB 8000
4200 NEXT M
4210 LPRINT CHR$ 155;"A";CHR$ 15
5;"A"
4220 LPRINT "CODE    AMOUNT";CHR
$ 155;"A"
4300 FOR M=1 TO 40
4310 IF T(M)=0 THEN GOTO 4350
4315 IF M<10 THEN GOTO 4328
4320 LPRINT " ";M;"     ";T(M)
4323 GOTO 4330
4328 LPRINT "  ";M;"     ";T(M)
4330 IF T(M)<0 THEN LET Q(1)=Q(1
)+T(M)
4340 IF T(M)>0 THEN LET Q(2)=Q(2
)+T(M)
4350 NEXT M
4400 LET Q(3)=Q(2)+Q(1)
4410 LPRINT CHR$ 155;"A";CHR$ 15
5;"A";
4420 LPRINT "INCOME = ";Q(2);"
   EXPENSE = ";Q(1);"      NET =
";Q(3)
4430 GOTO 10
5000 CLS
5005 LET P=INT (100*X/240)
5010 PRINT AT 10,5;"FILE USAGE I
NFORMATION"
5020 PRINT AT 12,6;"FILE HAS ";X
;" RECORDS."
5025 PRINT AT 13,6;"FILE IS ";P;
" P/C FULL."
5030 PRINT AT 15,6;"LAST RECORD
READ5:"
5040 PRINT X;TAB 9;D(X);TAB 17;C
$(X);TAB 22;A(X)
5050 PRINT W$(X);TAB 20;Y$(X)
5060 PRINT
5100 PRINT "PROGRAM = ";
5103 PRINT PEEK 16396+256*PEEK 1
6397-16509;" BYTES."
5110 PRINT "DATA AREA = ";
5120 PRINT (PEEK 16404+256*PEEK
16405)-(PEEK 16400+256*PEEK 1640
1);
5130 PRINT " BYTES."
5200 INPUT Z$
5210 GOTO 10
6000 CLS
6005 PRINT "WHICH RECORD?"
6010 INPUT M
6020 IF M>239 THEN GOTO 6000
6023 PRINT M;TAB 9;D(M);TAB 17;C
$(M);TAB 22;A(M)
6027 PRINT W$(M);TAB 20;Y$(M)
6030 PRINT "ALTER? OR DELETE?"
6040 IF INKEY$="D" THEN GOTO 650
0
6050 IF INKEY$="A" THEN GOTO 610
0
6060 GOTO 6040
6100 DIM Z$(15)
6105 PRINT "IF NO CHANGE, ENTER"
6110 PRINT AT 5,0;"DATE = ?"
6120 INPUT Z$(1 TO 6)
6130 IF Z$(1 TO 6)<>"      " THE
N LET D(M)=VAL Z$(1 TO 6)
6135 PRINT AT 1,9;D(M)
6140 PRINT AT 6,0;"TO/FROM = ?"
6150 INPUT Z$
6160 IF Z$<>"      " TH
EN LET W$(M)=Z$
6165 PRINT AT 2,0;W$(M)
6170 PRINT AT 7,0;"REASON = ?"
6180 INPUT Z$(1 TO 10)
6190 IF Z$(1 TO 10)<>"
" THEN LET Y$(M)=Z$(1 TO 10)
6195 PRINT AT 2,20;Y$(M)
6200 PRINT AT 8,0;"CODE = ?"
6210 INPUT Z$(1 TO 2)
6220 IF Z$(1 TO 2)<>"  " THEN LE
T C$(M)=Z$(1 TO 2)
6225 PRINT AT 1,17;C$(M)
6230 PRINT AT 9,0;"AMOUNT = ?"
6240 INPUT Z$
6250 IF Z$<>"                  " TH
EN LET A(M)=VAL Z$
6255 PRINT AT 1,22;A(M)
6260 PRINT AT 11,0;"ALL ENTRIES
OK? (YES/NO)"
6270 IF INKEY$="Y" THEN GOTO 10
6280 IF INKEY$="N" THEN GOTO 600
0
6290 GOTO 6270
6500 LET A(M)=0
6510 LET D(M)=0
6520 LET C$(M)="  "
6530 LET Y$(M)="                "
6540 LET W$(M)="                    "
6550 GOTO 10
7000 CLS
7005 LET L=0
7010 DIM Q(3)
7020 DIM T(40)
7100 PRINT AT 3,0;"YEAR = 19??"
7110 INPUT Z
7120 PRINT AT 3,9;Z
7200 PRINT AT 5,0;"YEARLY OR MON
THLY ACCOUNTS?"
7210 IF INKEY$="Y" THEN GOTO 730
0
7220 IF INKEY$="M" THEN GOTO 740
0
7230 GOTO 7210
7300 LET G=Z*10000
7310 LET S=G+9999
7320 GOTO 7450
7400 PRINT AT 5,0;"MONTH = ?
                "
7410 INPUT L
7420 PRINT AT 5,8;L
7430 LET G=Z*10000+L*100
7440 LET S=G+99
7450 CLS
7460 RETURN
7500 LET R=R+1
7510 IF R<6 THEN GOTO 3145
7520 LET R=0
7530 PRINT "ENTER TO CONTINUE"
7540 INPUT Z$
7550 CLS
7560 GOTO 3145
8000 FOR K=1 TO 40
8010 IF VAL C$(M)=K THEN LET T(K
)=T(K)+A(M)
8020 NEXT K
8030 RETURN
9000 CLS
9010 PRINT "READY CASSETTE, TYPE
 NAME, ENTER"
9020 INPUT Z$
9030 SAVE Z$
9040 GOTO 10
SYNTACTIC SUM:  60718, 8K ROM
```

ZX/TS LOOKS FOR TRAPPED MINDS

One of our research programs at Clover Bottom Developmental Center, a state facility for the mentally retarded, seeks ways to measure intellect in quadraplegic, non-verbal children. Their severe motor impairments prevent valid estimates of intellect--they can't reliably make gross motor or verbal responses. Children so afflicted might be thought mentally retarded because we cannot measure the childs potential.

We are evaluating a procedure to find a reliable motor function that such a child can control; reinforce the exercise of that function, and teach the child to use that motor function to communicate.

Briefly the research program sequence seeks to:

o Identify possible voluntary motor functions that could be used to operate a switch.

o Design and construct a suitable switch and appliances matched to the child's existing voluntary motor functions.

o Establish an operant-conditioned response using selected stimuli to reinforce switch activation.

o Test conditioned responses with various discriminative stimuli.

o Use a demonstrated, reliable response in a program combining an inexpensive microcomputer and human interaction to train the child in language expression.

Steps 3 and 4 employ the ZX/TS to collect real-time data and, at the end of each session, to analyze the data. Step 5 uses the computer for computer-assisted instruction in communication skills.

Information collected and stored by the ZX/TS includes: child's name, date, time of day, session length, number of switch operations, duration of each closure and percent of time the switch was activated.

We selected the ZX/TS because it's low-cost, easy to alter, low-powered (permitting economical and portable battery operation), expandible, furnished with a complete BASIC, & uses a membrane keyboard.

Responses by the child simulate key presses. We simply wired a jack to the keyboard circuit to connect the external switch.

William F. Tracy, Nashville, TN

RUBBING IT IN

Owners of ZX/TS and Atari 400 computers probably find membrane keys the weak point. Non-responsive keys, from misplaced or weak finger pressure, sneak errors into programs. To avoid dropped characters, one must watch the screen while entering. This slows keying.

Several vendors offer add-on, full-movement keyboards or overlays to position the fingers correctly.

But the problem really comes from treating membrane keyboards as typewriters. Typing skills, even ideas of how typing movements look, mislead us. Tapping membrane keys often produces errors. Never mind the similarities, a membrane isn't a typing keyboard.

Upset at this shortcoming, I experimented. I now cut errors and speed programming by pressing a key near its upper edge, and rubbing my finger over the key with enough force to make a slight "pop."

I can now type in--or should I say rub in--several lines with no need to check my screen for errors. With practice, this method proves fast and not especially awkward.

So, before you invest in an add on keyboard, try this method. You may save yourself the price of that peripheral you're saving for.

Michael R. Watson, Sonoma, CA

SOFTWARE REVIEW

Name: Analogies, Logical Reasoning
Type: Educational
ROM/RAM reqd: 8K/16K
Listable? Yes
Printed listing? No
Written in: BASIC and MC
Easy to load? Yes
Display: Good
Price: $14.95 each
From: Windcrest Software Inc.
POB 423, Waynesboro, PA
17268

Analogies and Logical Reasoning, two separate programs, pleasantly teach important concepts in logical thought. I found each suitable for junior high and up.

Analogies comes with two programs, one a demo containing 25 analogies and explanations of how analogies work. The computer gives the first three words; you supply the last. For example, pride: lions::gaggle: You answer geese, because a pride is a group of lions and a gaggle is a group of geese. The computer scores your analogy-perceiving ability. The analogies range from simple to clever.

On the other side you find an analogy utility that lets you easily create your own analogies. You enter all four words plus an explanation for users who do not guess correctly after two tries.

Logical Reasoning introduces conditional statements, contrapositives, converse and inverse statements, direct and indirect proofs and the invalid logic of analogies, circular arguments and generalization clearly and simply. It uses tests, drawings and puzzles to cleverly demonstrate logic. Learning how Sherlock Holmes knew which of the three men lied and exactly how many coins they found in the treasure through indirect proof held my attention for an hour.

On tape you get 12 programs to load one at a time, including a pre- and post-test. The computer

asks your name and manages to remember it through all 12 even though you load new programs. It also assures that you don't skip lessons by requiring an entry code if you don't go straight through.

Problems: Both programs contain annoying misspellings. This proved crucial only in Analogies, where the computer rejected my (correct) spelling of venison. Also, inquiring minds may find the programs run slowly. Windcrest should make Analogies self-running, since mistakenly starting with RUN destroys the analogy sets.

Each program comes attractively packaged like a book and includes a short instruction manual.

Windcrest makes game and educational software for several different home computers on both tape and disk. I'm glad to see them offering such high-quality educational software for ZX/TS users.

Ann L. Zevnik, Boston, MA

SOFTWARE REVIEW

Name: Multiple Regression Analysis
Type: Statistical Analysis
Price: $15.95
ROM/RAM required: 8K/16K min.
Printed Listings? No
Program Listable? Yes
Easy to load? Yes
Easy to use? No
Written in: BASIC
Display: Functional
From: Programmers at Large
POB 24362
Fort Worth,
TX 76112-9362

This program does a very good job number crunching. To test it, I used data involving 95 observations on 8 variables. An IBM-360 mainframe gave me these results:

Y=2.9+.12X(1)+.96X(2)-1.91X(3)+

1.82X(4)+2.36X(5)+32.37X(6)+

3.67X(7) with r^2=.95 and F=237.8

My ZX81 and this program gave:

Y=3.06+.114X(1)+.959X(2)-1.91X(3)+

1.829X(4)+2.36X(5)+32.33X(6)+

3.673X(7) with r^2=.95 and F=237.15

While MRA crunches numbers well, it displays three major categories of flaws. One, it is not user-friendly. Two, it leaves out important results. And three, it shows evidence of poor programming.

According to the instructions, you should redimension five arrays based on the number of variables and observations, but the instructions don't tell you how and the program self-starts. They indicate that with 20 variables and 200 observations you would DIM T(4000), but 16K will not allow this. The program does not let you review data entered to check for errors nor correct data.

In using multiple regression, you must know whether the data has multicollinearity. (Multicollinearity results when two or more independent variables are correlated. For example, if you want to develop an equation to predict the density of water using observations on the height from sea level, temperature in degrees C and degrees K, you would find perfect correlation, and thus perfect multicollinearity, between the two temperatures. This renders the resulting equation invalid.) In research using regression, we commonly withhold some data when developing the equation. Then we apply this data to the resulting equation to see how well it predicts. MRA does not let you use the equation at all.

You need not redimension five arrays. Delete lines 3, 4, 10, 15 and 20 and add:

```
101 DIM T(N*M)

102 DIM M(N)

103 DIM Y(N)

104 DIM X(N)

105 DIM R(N*(N+1))
```

At a cost of seven bytes, the program now self-dimensions.

MRA wastes about 130 bytes on REM statements and 20 bytes by using E-N-T-E-R instead of ENTER in PRINT statements. It uses no string variables although this would also save memory.

As MRA now stands, I cannot recommend it. I had to spend several hours cleaning up major flaws before I could test it. Developing a multicollinearity matrix may exceed the limits of a 16K machine, but all my other corrections result in a net memory savings. If the authors correct these flaws, I would rate MRA as excellent.

Ronny Richardson, Chamblee, GA

SOFTWARE REVIEW

Program: Mazogs
Type: Maze game
ROM/RAM reqd: 8K/16K
Printed listings? No
Listable? Yes
Easy to Load: Yes
Written in: BASIC and MC
Display: Superb
From: Softsync Inc., 14 E. 34th St., New York, NY 10016 212/685-2080
Price: $19.95

Few ZX/TS programs can claim Mazog's excellent union of strategy, display and sophistication.

In this high-speed game you navigate an intricate maze in a set number of moves to find a treasure and bring it home. Ugly Mazogs along the route try to kill you. You can only win more moves by killing Mazogs; if you run out of moves you die. To kill the vile Mazogs, you find swords, but each sword serves only one use. The program carefully balances the number of swords and Mazogs en route to the treasure, and the ratio becomes more adverse as you rise to higher difficulty levels.

Besides swords and your wits, you use prisoners trapped in the walls who tell the way. The route appears for about 10 seconds, then vanishes, leaving you on your own again. In the advanced level, prisoners die after pointing the way, making it near impossible to find your way back home if you use them all to find the treasure.

Any time you may view a larger section of the maze, at a small cost in moves; you can also learn your distance from the treasure or your base, again, at a cost. You can even buy a sword for the not-so-small cost of half your remaining moves.

Mazogs includes professional and effective touches that make it worth its $20 price tag. These include a running title screen (you see all the objects before playing), the effective key layout (actually giving a choice of control keys--I found both sets easy to handle) and an involving display.

Machine code provides visually effective and speedy animation for on-screen figures and your man's combat contortions. The MC also quickly solves the maze when you ask a prisoner and the full-maze scrolling and solution at the end.

Mazog's complexity lies in the challenging difficulty of the maze and escaping with the treasure, not in mastering odd keyboard layouts or confusing screen displays. A game not easily mastered, it won't sit dusty in your collection. And make a backup --I wore my original out after two weeks of continuous use. This is the finest game of its type I've seen for ZX/TS's. Even a friend who owns an Apple said "Wow" when he saw Mazogs.

William Marriott, Canton, MI

PIE CHART--A REFINEMENT--8K/16K

Refining Ron Oblander's chart (Nov.82) makes it run faster and puts table and chart on 1 display. But, it omits the segment titles.

After entering PC, SAVE using GOTO 970. It comes up running and stops with a 9 report. For another chart, RUN again.

After a title screen, PC asks the number of segments. You enter up to 18, the most the table holds on one screen. Then enter segment values one by one. After the last value, the computer shifts to FAST for about 6 seconds to produce the pie outline and table heading. Now in SLOW, the computer lays in the segments and table. At the end you can COPY the screen to a printer.

On the chart, segment 1 starts at the 12 o'clock position; others follow serially clockwise. The table gives segment number, value, percent of pie, & total of values.

Variables Q and R control pie position and radius. PC puts the pie in the lower right corner with an 18-pixel radius. The trig work exploits ZX/TS's internal MOD feature. One array, E(C), holds each segment value. I serves as index variable in two loops. You can use tokens in the print statements (Syntactic Sum here is for words spelled out.--AZ). Variable NØ carries the number Ø.

John Pazmino, Brooklyn, NY

```
  1 LET NØ=Ø
  2 PRINT AT 10,NØ;"PIECHART FO
R UP TO 18 SEGMENTS"
  3 PAUSE 200
  4 CLS
  6 LET T=NØ
  8 LET R=18
 10 LET Q=45
 12 LET W=NØ
 15 PRINT " INPUT NUM OF SEG:"
 20 INPUT C
 22 DIM E(C)
 26 FOR I=1 TO C
 41 PRINT " THEN INPUT VAL FOR
SEG ";I;":"
 42 INPUT E(I)
 45 CLS
 57 LET T=T+E(I)
 59 NEXT I
100 FAST
105 PLOT Q,R
120 FOR P=NØ TO 6.3 STEP Ø.056
140 PLOT Q+SIN P*R,R+COS P*R
200 NEXT P
205 PRINT AT NØ,NØ;"SEG";TAB 4;
"VAL ";TAB 10;"O/O"
217 SLOW
220 FOR I=1 TO C
230 LET Z=E(I)*2*PI/T
405 LET W=Z+W
410 LET M=SIN W
420 LET N=COS W
560 FOR J=NØ TO R
570 PLOT Q+M*J,R+N*J
580 NEXT J
920 PRINT AT I,NØ;I;TAB 4;E(I);
TAB 10;INT (E(I)*100/T+Ø.5)
930 NEXT I
960 PRINT TAB 4;"----";TAB NØ;"
SUM ";T
965 STOP
970 SAVE "PIECHAR"
980 RUN
SYNTACTIC SUM:  38512, 8K ROM
```

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